directing the reflected autofocusing light beam to a detection system;

sensing the autofocusing light beam with a light detector of the detection system;

determining, based on the sensed autofocusing light beam, the amount of displacement of an image plane of the reflected autofocusing light beam from a desired reference plane; and

focusing on the object plane to create a properly focused image,

wherein said sensing includes transmitting the reflected autofocusing light beam at least partially through an aperture of an iris and measuring the light intensity of the reflected autofocusing light beam that is transmitted through the aperture with the light detector of the detection system.

REMARKS

In the February 13, 2002 Office Action, the Examiner stated that the Information Disclosure Statement filed March 8, 2000 failed to comply with 37 C.F.R. § 1.98(a)(2). The Examiner objected to the disclosure for numerous alleged errors; objected to claims 23, 24, and 31 for alleged informalities; and rejected claims 24, 28, 32, and 40 under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. The Examiner also rejected claims 32-35, 38, 39, and 41 under 35 U.S.C. § 102(b) as allegedly being anticipated by Nakamura et al. (U.S. Patent No. 4,450,547); rejected claims 45-48 as allegedly being anticipated by Abe (U.S. Patent No. 5,892,622); rejected claims 45, 49, and 50 as allegedly being anticipated by Muller et al. (U.S. Patent No. 5,359,417); rejected claims 1, 2, 7, 13-16, 18, 22, 23, 25, 26, 30, and 31 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Liegel et al. (U.S. Patent No. 5,925,874); rejected claims 3, 4, 8-12, 19, 20, and 27-29 under 35 U.S.C. § 103(a) as allegedly being

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unpatentable over Liegel et al. in view of Nakamura et al.; rejected claims 36, 37, 40, and 42-44 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Nakamura et al.; and rejected claims 17 and 24 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Liegel et al. in view of Neumann et al. (U.S. Patent No. 4,959,829).

By this Amendment, Applicants have canceled claims 38-44 and amended claims 1, 23, 24, 28, 31, and 32. Reconsideration and withdrawal of the rejections is respectfully requested.

In the February 13, 2002 Office Action, the Examiner stated that the Information Disclosure Statement filed March 8, 2000 failed to comply with 37 C.F.R. § 1.98(a)(2), and "the information which has been lined through therein has not been considered." The undersigned Applicants' representative spoke with Examiner Spears on May 3, 2002 to inquire into the bases for the objection to the references. In a voice-mail message received on May 7, 2002, Examiner Spears indicated that the lined-through documents were not included in the file. Although Applicants believe that the lined-through documents were properly submitted with the March 8, 2000 Information Disclosure, Applicants hereby resubmit the lined-through documents shown on the attached PTO-1449.

Also in the Office Action, the Examiner objected to the specification for allegedly containing numerous errors. Applicants have amended the specification, taking into account the Examiner's suggestions. The Examiner also objected to the claims 23, 24, and 31 for minor typographical errors. Applicants have amended these claims as suggested by the Examiner. The amendments to the specification and claims are shown in the attached Appendix.

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The Examiner rejected claims 24, 28, 32, and 40 under 35 U.S.C. § 112, second paragraph, as being indefinite. Although Applicants do not necessarily agree with the Examiner's rejections, Applicants have canceled claim 40 and amended claim 24, 28, and 32, without prejudice or disclaimer. The amendments are shown in the attached Appendix.

Claims 32-35, 38, 39, and 41 were rejected under 35 U.S.C. § 102(b) as being anticipated by Nakamura et al. Independent claim 32 recites a method of automatically focusing an image of an object plane in a microscope. The method includes the steps of: generating an autofocusing light beam; directing the autofocusing light beam against the object plane to be examined; reflecting the autofocusing light beam off the object plane; and directing the reflected autofocusing light beam to a detection system. The method further includes: sensing the autofocusing light beam with a light detector of the detection system; determining, based on the sensed autofocusing light beam, the amount of displacement of an image plane of the reflected autofocusing light beam from a desired reference plane; and focusing on the object plane to create a properly focused image. The step of sensing includes transmitting the reflected autofocusing light beam at least partially through an aperture of an iris and measuring the light intensity of the reflected autofocusing light beam that is transmitted through the aperture with the light detector of the detection system.

Nakamura et al. discloses a focal position detecting optical apparatus. Contrary to the Examiner's assertions, Nakamura et al. fails to disclose a method of automatically focusing an image of an object plane in a microscope, in which, among other things, the step of sensing an autofocusing light beam with a light detector includes transmitting a

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reflected autofocusing light beam at least partially through an aperture of an iris and measuring the light intensity of the reflected light beam that is transmitted through the aperture with the light detector of a light detection system. Nakamura et al. fails to disclose transmitting an autofocusing light beam at least partially through an aperture of an iris.

The Examiner apparently contends that mask 20 in the embodiment shown in Fig. 9 and mirror 58 in the embodiment shown in Fig. 25 of Nakamura et al. both comprise an aperture of an iris. The Examiner offers no support for this assertion, nor can any be found in the reference itself. In fact, neither mask 20 nor mirror 58 include an aperture in any manner. Quite simply, the mask and mirror shown in Nakamura et al. are not apertures of an iris under any reasonable interpretation of the terms "aperture" or "iris." For at least this reason, claim 32 is allowable over Nakamura et al.

Additionally, the sensing method of Nakamura et al. does not include measuring the light intensity of a reflected autofocusing light beam that is transmitted through an aperture of an iris. Because there is no aperture or iris in Nakamura et al., the reference cannot disclose a method of measuring the light intensity transmitted through an aperture of an iris. Moreover, Nakamura et al. does not disclose a sensing method that measures light intensity, as recited in the claim. Instead, Nakamura et al. measures the differences between the outputs of component detectors 61 and 62 in order to accomplish automatic focusing. This method is different from the claimed invention.

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For at least these reasons, claim 32 is not anticipated by Nakamura et al. Claims 33-35 depend from claim 32 and should therefore be allowable for at least the same reasons claim 32 is allowable.

Claims 36, 37, 40, and 42-44 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakamura et al. Claims 36 and 37, which depend from independent claim 32 above, should be allowable for at least the same reasons claim 32 is allowable. In addition to the subject matter of claim 32, claim 36 recites the steps of, simultaneously with generating of the autofocusing light beam: generating an illumination light beam; illuminating the object plane with the illumination light beam; and reflecting the illumination light beam off the object plane to create an image of the object plane.

Nakamura et al. fails to teach or suggest the subject matter of claim 36. In the Office Action, the Examiner admits that Nakamura et al. fails to teach reflecting an illumination light beam off an object plane to create an image of the object plane. (Office Action, page 17.) Instead of pointing to a particular teaching or suggestion in the prior art, the Examiner merely states that "it is well known in the art to view an image of a surface using a microscope, in order to provide an auto-focus for a device to image microscopic surfaces." Such a rejection is contrary to the Federal Circuit's repeated holdings that a suggestion or motivation is essential in order to modify prior art references. *See In re Lee*, 277 F.3d 1338, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002); *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 664-65, 57 U.S.P.Q.2d 1161 (Fed. Cir. 2000); *In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999). *See also* M.P.E.P. § 2143.01. In addition to making an obviousness rejection without the

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requisite teaching or suggestion, the Examiner appears to be taking judicial notice of a technical aspect that is not capable of instant and unquestionable demonstration. *See In re Ahlert*, 424 F.2d 1088, 1091, 165 U.S.P.Q. 470, 474 (CCPA 1973). *See also* February 21, 2002 Memo from Stephen G. Kunin to the Patent Examining Corps, entitled *Procedures for Relying on Facts Which are Not of Record as Common Knowledge of for Taking Official Notice*. Applicants respectfully assert that the Examiner is improperly failing to provide evidentiary support for the proposition recited in claim 36. For at least the above reasons, the obviousness rejection of claims 36 and 37 over Nakamura et al. must fail.

Claims 1, 2, 7, 13-16, 18, 22, 23, 25, 26, 30, and 31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Liegel et al. Independent claim 1 recites an apparatus for automatically focusing an image of an object plane in a microscope. The apparatus includes: an optical system configured to form an image of an object plane to be observed; an autofocusing detection system; and a focusing correction system. The optical system comprises: an objective lens configured to focus on the object plane, an illumination beam source for illuminating the object plane with an illumination light beam of a first wavelength, and an image lens configured to create an image of the object plane. The autofocusing detection system comprises an autofocusing light beam source for generating an autofocusing light beam of a second wavelength, a beamsplitter configured to direct the autofocusing light beam to the object plane and cause the autofocusing light beam to reflect off the object plane, a detection system lens configured to direct the reflected autofocusing light beam to an autofocusing detection device. The autofocusing detection device determines the amount of

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displacement of the image of the object plane in the optical system from a desired focused reference plane based on the detected displacement of an image plane of the reflected autofocusing light beam from a predetermined reference plane in the autofocusing detection system. The autofocusing detection device comprises at least one sensor for sensing the reflected autofocusing light beam and detecting the displacement of the image plane. The focusing correction system comprises a feedback controller and focus adjusting device for automatically adjusting the distance between the objective lens and the object plane, based on the reflected autofocusing light beam sensed by said at least one sensor, in order to properly focus the image in the optical system.

Liegel et al. discloses a microscope with an autofocus arrangement. Among other things, Liegel et al. does not disclose or suggest an illumination beam source for illuminating the object plane with an illumination light beam of a first wavelength, and an autofocusing light beam source for generating an autofocusing light beam of a second wavelength. It is undisputed that Leigel et al. makes no mention of an illumination beam source for illuminating the object plane. In the Office Action, the Examiner admits that Liegel et al. does not teach an illumination beam source for illuminating the object plane with an illumination light beam of a first wavelength. (Office Action, page 10.) Nor does the Examiner assert that Liegel et al. provides any suggestion or motivation to add an illumination beam source of a first wavelength in combination with an autofocusing light beam source for an autofocusing light beam of a second wavelength. Instead of providing a motivation or suggestion from the prior art, the Examiner makes the bald

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assertion that "it is well known in the art" to use illumination light sources "in order to provide for color microscopic images of the object plane."

As indicated above, the Federal Circuit has repeatedly held that a suggestion or motivation is essential in order to modify prior art references. *See In re Lee*, 277 F.3d 1338, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002); *Ruiz v. A.B. Chance Co.*, 234 F.3d 654, 664-65, 57 U.S.P.Q.2d 1161 (Fed. Cir. 2000); *In re Dembiczak*, 175 F.3d 994, 999, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999). *See also* M.P.E.P. § 2143.01. Such a suggestion or motivation is lacking here. Moreover, it appears as though the Examiner is taking judicial notice of a fact that is not capable of instant and unquestionable demonstration as being well-known, in violation of case law and instructions from the PTO itself. *See In re Ahlert*, 424 F.2d 1088, 1091, 165 U.S.P.Q. 470, 474 (CCPA 1973). *See also* February 21, 2002 Memo from Stephen G. Kunin to the Patent Examining Corps, entitled *Procedures for Relying on Facts Which are Not of Record as Common Knowledge of for Taking Official Notice*. For at least these reasons, the obviousness rejection of claim 1 over Liegel et al. must also fail.

Independent claims 18 and 26 recite, among other things, a system for automatically focusing an image in a microscope, including an imaging system for creating an image of an object plane using an illumination light beam of a first wavelength, in combination with an autofocusing detection system that includes an autofocusing light beam of a second wavelength. The Examiner rejected claims 18 and 26 on the same basis of independent claim 1 discussed above. For at least the reasons stated above for claim 1, the obvious rejection of claims 18 and 26 as being unpatentable over Liegel et al. must also fail.

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Each of the claims that depend from independent claims 1, 18, and 26 are allowable for at least the same reasons as the independent claims from which they depend, in addition to the additional limitations of the dependent claims. For example, claim 2 (as well as independent claim 18) recites that the autofocusing detection device also includes an iris for permitting the reflected autofocusing light beam to pass at least partially through an aperture of the iris, the at least one sensor measuring the intensity of the reflected autofocusing light beam that passes through the aperture of the iris. In the Office Action, the Examiner asserts that passage opening 37 shown in Fig. 3 of Liegel et al. comprises an iris. (Office Action, page 10.) This rejection must fail because no reflected light beam from the object plane is permitted to pass through the aperture of passage opening 37 shown in Fig. 3 of Liegel et al. Moreover, Liegel et al. clearly lacks a sensor that measures the intensity of a reflected autofocusing light beam that passes through an opening because a reflected autofocusing light beam does not pass through the passage opening 37. For at least this additional reason, the obviousness rejection of claim 2 (and 18) over Liegel et al. must fail.

Claims 3, 4, 8-12, 19, 20, and 27-29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Liegel et al. in view of Nakamura et al. Nakamura et al. fails to make up for the deficiencies of Liegel et al. articulated in the discussion of independent claims 1, 18 and 26 above. Moreover, for reasons previously discussed, Nakamura et al. fails to teach or suggest the use of an aperture or iris. Instead, Nakamura et al. merely teaches the use of a mask or mirror. Because Nakamura et al. does not even include an iris, it cannot serve as the required teaching or suggestion to modify the positions of an iris, as recited in, for example, claims 3, 4, 19, and 20. For at least these

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reasons, the obviousness rejections of claims 3, 4, 8-12, 19, 20, and 27-29 over Nakamura et al. must fail.

Claims 17 and 24 were rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Liegel et al. in view of Neumann et al. Because Neumann et al. fails to make up for the deficiencies of Liegel et al., this rejection must fail.

Claims 45-48 were rejected under 35 U.S.C. § 102(b) as being anticipated by Abe. Claims 45, 49, and 50 were also rejected as being anticipated by Muller et al. Independent claim 45 recites a microscope for viewing an object plane. The microscope comprises a plurality of lenses positioned along a main optical axis of the microscope, a probe arm supporting the plurality of lenses, a support on which an object with an object plane to be examined is placed, the object plane substantially extending along a focus plane that is observed through the microscope, and an optical output device for creating an image of the object plane on an image plane. The probe arm extends generally along the main optical axis. The main optical axis is unfolded and substantially extends along a single plane.

Neither Abe nor Mueller et al. anticipate or render obvious independent claim 45. Abe discloses an automatic focusing device for an optical microscope 1. The optical microscope of Abe includes a lens barrel unit 5 having an objective lens 2, an eye piece 3, and an illuminating unit 6 for radiating an illuminating light beam to the object 4 being observed, and an automatic focusing device 7 for measuring the separation between the objective lens 2 and the object 4 for focusing. (Abe, col. 4, ll. 6-12; Fig. 1.) The Examiner asserted that the lenses 11 and 14 in the illuminating unit 6 comprise a plurality of lenses positioned along a main optical axis of the microscope. Applicants

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respectfully disagree. The lenses in the illuminating unit are not along a main optical axis of the microscope--in fact, they play no role in the magnification of the microscope and are used for illumination purposes only. The lenses of the illuminating unit of Abe are positioned orthogonal to the main optical axis, not along the main optical axis. Moreover, contrary to the Examiner's assertion, the illuminating unit 6 of Abe does not comprise a probe arm supporting the plurality of lenses along a main optical axis of the microscope. For at least these reasons, claim 45 is allowable over Abe.

Muller et al. discloses a surgical microscope for conducting computer-supported stereotactic microsurgery. As shown in Fig. 1 of Muller et al., the surgical microscope is mounted to a supporting stand 2. The Examiner asserts that reference number 7 is a probe arm supporting a plurality of lenses. The basis for this rejection is unclear, as reference number 7 in Fig. 1 of Muller et al. corresponds to a frame 7 which is fixedly connected to an operating table for stabilizing the head 6 of the patient on the operating table. Muller et al. does not disclose a probe arm supporting a plurality of lenses positioned along a main optical axis of a microscope, the probe arm extending generally along the main optical axis, wherein the main optical axis is unfolded and substantially extends along a single plane. For at least these reasons, claim 45 is allowable over Muller et al.

Claims 46-50 depend from claim 45 and should therefore be allowable for at least the same reasons claim 45 is allowable.

The Examiner indicated that claims 5, 6, 21, 51, and 52 would be allowable if rewritten in independent form. Applicants appreciate the indication of allowable subject matter. However, since Applicants believe that the claims from which the indicated

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allowable claims depend are also allowable, these claims have not be placed in independent form. Applicants request confirmation of the same in the next official communication.

In view of the foregoing amendments and remarks, Applicants respectfully request the reconsideration and reexamination of this application and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
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Dated: May 13, 2002

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APPENDIX TO AMENDMENT OF MAY 13, 2002

Amendments to the Specification--bracketed material has been deleted and underlined material has been added.

On page 4, the paragraph starting at line 3 has been modified as follows:

In a further respect, the invention is directed toward a system for automatically focusing an image in a microscope. The system includes an imaging system for creating an image of an object plane using an illumination light beam of a first wavelength, and an autofocusing detection system. The autofocusing detection system includes an autofocusing light beam of a second wavelength. The autofocusing light beam is directed to reflect off of the object plane. The autofocusing detection system further includes [a] an autofocusing detection device having an iris and a light detector, and a detection system lens. The detection system lens directs the reflected autofocusing light beam to the autofocusing detection device. The autofocusing detection device receives the reflected autofocusing light beam from the detection system lens. The iris permits at least a portion of the reflected autofocusing light beam to pass through an aperture of the iris. The light detector measures the intensity of the portion of the reflected autofocusing light beam that passes through the aperture of the iris in order to detect the distance that the image of the object plane in the imaging system is displaced from a desired focus reference surface.

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On page 21, the paragraph starting at line 8 has been modified as follows:

In the example shown in Figs. 3A-3C, the autofocusing light beam source 39 generates and projects the autofocusing light beam 40 in a first direction parallel to the first optical axis 56. The autofocusing light beam 40 strikes the first beamsplitter 42 of the autofocusing detection system and is reflected along a second optical axis 64 to the second beam splitter 44 of the autofocusing system. Alternately, the apparatus could be configured so that the autofocusing light beam source 39 generates the autofocusing light beam 40 directly onto the second beamsplitter 44, without needing the first beamsplitter 42. In another possible configuration, the light source 39 for the autofocusing beam could generate the autofocusing light beam 40 directly to the objective lens [16] <u>14</u>.

On page 21 (spanning onto page 22), the paragraph starting at line 18 has been modified as follows:

The beamsplitters 42, 44 used in the present invention may be of any conventional type known in the art. For example, the beamsplitters 42, 44 may be partially reflecting [conventionally] <u>conventional</u> beamsplitters. Beamsplitter 44 is preferably configured to transmit all of the illumination light beam of wavelengths λe and λf while reflecting the autofocusing light beams of a wavelength λa. In one example, beam splitter 42 is preferably configured to use a polarizing beam splitter and a ¼ wavelength plate. As shown in Fig. 3A, upon striking the second beamsplitter 44, the autofocusing light beam 40 is reflected toward the objective lens 14 along the first optical axis 56. The beamsplitter 44 is configured to reflect the autofocusing light beam of wavelength λa. If the beams are operated simultaneously, the beam splitter 44 also

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allows the reflected illumination light beam 52 to pass therethrough as previously described.

<u>Amendments to the Claims</u>--bracketed material has been deleted and underlined material has been added.

1. (Amended) An apparatus for automatically focusing an image of an object plane in a microscope, comprising:

an optical system configured to form an image of an object plane to be observed, said optical system comprising:

an objective lens configured to focus on the object plane,

an illumination beam source for illuminating the object plane with an illumination light beam <u>of a first wavelength</u>, and

an image lens configured to create an image of the object plane;

an autofocusing detection system comprising:

an autofocusing light beam source for generating an autofocusing light beam <u>of a second wavelength</u>,

a beamsplitter configured to direct the autofocusing light beam to the object plane and cause the autofocusing light beam to reflect off the object plane,

a detection system lens configured to direct the reflected autofocusing light beam to an autofocusing detection device, and

an autofocusing detection device for determining the amount of displacement of the image of the object plane in the optical system from a desired focused reference plane based on the detected displacement of an image plane of the reflected autofocusing light beam from a predetermined reference plane in the autofocusing detection system, said autofocusing detection device comprising at least

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one sensor for sensing the reflected autofocusing light beam and detecting the displacement of the image plane; and

a focusing correction system comprising a feedback controller and focus adjusting device for automatically adjusting the distance between the objective lens and the object plane, based on the reflected autofocusing light beam sensed by said at least one sensor, in order to properly focus the image in the optical system.

23. (Amended) The system of claim 22, wherein the focus adjusting device is configured to [adust] adjust the position of the objective lens in order to properly focus the imaging system on the object plane.

24. (Amended) The system of claim 22, wherein the focus adjusting device is configured to [adust] adjust the position of the objective plane [lens] in order to properly focus the imaging system on the object plane.

28. (Amended) The system of claim 26, wherein the autofocusing detection device further comprises a cylindrical lens positioned between the detection system lens and the plurality of light sensors, said cylindrical lens configured to change the shape of a light spot on the plurality of [diodes] light sensors when the distance between the object plane and objective lens changes.

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31. (Amended) The system of claim 30, wherein the focus adjusting device is configured to [adust] <u>adjust</u> the position of the objective lens in order to properly focus the imaging system on the object plane.

32. (Amended) A method of automatically focusing an image of an object plane in a microscope, comprising:

generating an autofocusing light beam;

directing the autofocusing light beam against the object plane to be examined;

reflecting the autofocusing light beam off the object plane;

directing the reflected autofocusing light beam to a detection system;

sensing the autofocusing light beam with a light detector of the detection system;

determining, based on the sensed autofocusing light beam, the amount of displacement of [the] <u>an</u> image plane of the reflected autofocusing light beam from a desired reference plane; and

focusing on the object plane to create a properly focused image,

wherein said sensing includes transmitting the reflected autofocusing light beam at least partially through an aperture of an iris and measuring the light intensity of the reflected autofocusing light beam that is transmitted through the aperture with the light detector of the detection system.

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